

**Delta Science Plan Review –  
Delta Independent Science Board  
DRAFT 30 November 2018**

**Background and Fundamental Guidance**

This memo summarizes the review by the Delta Independent Science Board (Delta ISB) of the October 12, 2018, draft of the second 5-year Delta Science Plan.

The first Delta Science Plan established the motto “One Delta, One Science.” This motto expresses a high aspiration to enhance collaboration among the agencies, institutions, and individuals involved in the diverse aspects of science for the Sacramento-San Joaquin Delta to provide a firmer and more forward-looking basis for public and policy discussions and decisions. In essence the Delta Science Plan describes **how** to advance the “One Delta, One Science” goal by improving science integration, facilitating the flow of information among different science programs, and strengthening links between science and decision-making for the Delta. This overarching purpose of the Delta Science Plan, to bring agencies and institutions together, needs to be emphasized upfront and advanced more strongly in the updated plan.

The 2018 update to the Delta Science Plan intends to identify opportunities to continue successes of the original Delta Science Plan and further achieve the vision of “One Delta, One Science.” The Delta ISB appreciates the tremendous work involved to update the Delta Science Plan and recognizes the importance of the interagency consensus achieved. The full implementation of this second plan should certainly enhance the ability of Delta scientists to work as a community to advance and recognize science priorities, fill scientific gaps, and better inform decision-making.

There has been improvement in scientific output, collaboration, and coordination since 2010 when the Delta Stewardship Council, Delta Science Program, and Delta ISB were established and since the 2013 Delta Science Plan. An update to the Delta Science Plan should recognize and embolden processes which were successful, but also sunset or improve on less effective efforts. The updated plan should also reflect new scientific understanding, new technologies, and new organizational structures and processes for evolving science and decision-making needs.

Overall, the Delta ISB’s primary recommendation is that the updated Delta Science Plan should be **bolder, more flexible** and **more strategic**. It should go beyond focusing only on important incremental accomplishments or building on existing efforts or science infrastructure. The Delta Science Plan will attain greater heights if aspirational goals recognize the growing needs for Delta science and heed recommendations from such efforts as the State of Bay-Delta Science, Science Enterprise Workshop, the Delta Challenges Workshop and the Environmental Data

Summit. Although, the current Delta Science Plan is not specifically designed to set science priorities, science priorities and understanding will drive common Delta science community actions. The Delta Science Plan needs to be flexible and forward-looking because the Delta environment is facing major changes in climate, ecosystems, species composition, regulations, water supply reliability and extreme events. At the same time, the Delta Science Plan needs to recognize the Delta's long history (~5,000 years) of Native Californian influences on the lands and waters and to draw upon Traditional Ecological Knowledge for relevant guidance for the future. A format for continual assessment of emerging issues should be considered. Strategic grand challenges and ecosystem-level goals can help structure interdisciplinary research and focus interagency collaboration.

Developing a Delta Science Plan is difficult but is a major accomplishment and provides overall guidance in bringing together the Delta science community to better serve decision-making discussions and actions. The Draft Plan has many admirable ideas. Our review below makes some specific major recommendations and example suggestions that address the questions posed to us.

### Major Recommendations

**1) Institute a high-level framework that directly and comprehensively addresses how the Delta's many science agencies and institutions can better come together to achieve "One Delta, One Science" and strengthen and broaden support of the Delta Science Plan as a whole.** Consider making the plan a cohesive collection of integrating mechanisms plus actions organized with enthusiasm from multiple Delta science agencies and institutions. Accomplishing each action identified in the Delta Science Plan is unlikely to be enough to achieve "One Delta, One Science" broadly across the Delta science community. Broad involvement alone is not integration. This tall order will need to be pursued persistently and persuasively at political and science management levels. More explicit engagement and support from other agencies and institutions that sponsor and use science would provide a firmer, more forward-looking and effective basis for a broad Delta Science Plan, providing intellectual leadership and direction for managing the Delta. We recommend a specific workshop sponsored by the Delta Science Program to help establish a standing committee for identifying initiatives to integrate Delta science to achieve the "One Delta, One Science" goal and implement the suggestions below.

#### Suggestions:

- a. Develop a framework for planning scientific activities and resources overseen by the lead scientists of multiple agencies and involving other agencies and universities, with commitments of resources by multiple agencies. Such a community of scientists can

keep competing scientific interpretations in mind and still come to a shared judgment of the implications for scientific and policy actions.

- b. Establish mechanisms to facilitate and encourage the Delta institutions to develop common science. Coordinating mechanisms might include a Council of Lead Scientists across the agencies who meet quarterly with an agenda for developing and supporting complementary and integrated actions, perhaps including a common budget proposal to the legislature or agencies. Routine mechanisms for cross-agency coordination and integration seem needed.
- c. Include an accompanying or follow-on **implementation** plan or appendix, with commitments of agency responsibilities and resources, timeline, and buy-in from the institutional community around Delta science. Include a list of commitments of funding, resources, expertise, and leadership that individual agencies are willing to contribute for a series of common science goals.
- d. Focus on mechanisms for major agencies, stakeholders, and experts to identify major science needs and common science and technical activities to fill gaps and reduce redundancy in a variety of areas. Science activities across agencies might be organized by current overarching issues, ongoing grand challenges, fundamental drivers (like climate change) or holistic environmental goals or science priorities.
- e. Add a wish list of important common science activities that lead scientists in each agency would like to accomplish, but currently lack funding or authority, which the legislature and agency managers might ponder.
- f. Consider collaborative mechanisms for identifying Emerging Science Issues and proactive approaches.
- g. Link the Delta Science Plan to other science coordinating efforts. A short paragraph on page 11 puts the Plan in the context of the Science Action Agenda and the State of Bay-Delta Science, but this should be expanded a bit and placed much earlier. The existing linkages diagram showing the frequency of interactions is good, but additional interpretation of this diagram would help. The Plan then should identify processes and first steps within the Delta context to address challenges integrating individual agency findings into a more coherent understanding that is useful for decision-making.
- h. Incorporate the Delta ISB into the Delta Science Plan and how the Delta ISB and Delta Science Program complement each other. The Delta ISB is the only formally recognized body for peer review of all science done for the Delta, and its role in a larger Delta Science Strategy might be usefully reported (e.g., pages 6 -8, Figure 1.1 and Table 1.1). This formal recognition might aid implementation of Delta ISB recommendations to set regional and strategic science priorities and help in setting science priorities (along with the Science Action Agenda).

**2) Include broader time and geographic scales and extreme events.**

Suggestions:

- a. A longer time horizon for science and science planning would better address climate change and ensuing grand challenges.
- b. Include relevant science beyond the Delta. Ideas and talent from outside the Delta could bring new perspectives for building syntheses that might be useful for the Delta.
- c. Attention is needed on pre-planning for the science often needed in the immediate timeframe of episodic, extreme events. The recent drought, followed by a year of intense rains and floods, and recent wildfires are emblematic of the warmer and more variable conditions expected in the future. Learning from these events and the feedbacks and interactions of these events should be a theme of planned research.

**3) Expand discussion of changes and accomplishments from the first Delta Science Plan.**

Suggestions:

- a. An early section should summarize the last plan, describe what was accomplished, and not accomplished and why (what was learned), and argue how the new plan picks up from the last five years of experience and new knowledge. This would naturally lead to key performance measures for the next five years that could be further elaborated at the end of the plan. Readers will appreciate the value of this plan more if they see accomplishments and lessons from the previous plan.
- b. Merely referring to the vision of “One Delta, One Science” is not sufficient. Provide a cogent description of what has been revised. This update to the Delta Science Plan should reflect new knowledge, new insights, new technology and new management landscapes and problems. Although the document counts changes (e.g. number of new actions, number of appendices), it does not give a sense of major plan changes and why they were done.
- c. A section could be added that points out relevant events over the last 5 years and how they triggered additions and changes to the Delta Science Plan. These could include the Science Enterprise Workshop, the Delta ISB’s reviews on adaptive management and other topics, and the Delta Stewardship Council’s synthesis papers for the Delta Plan Ecosystem Amendment.
- d. Recognize if parts of the Delta Science Plan did not bear fruit and specifically delete or improve on these. Note lessons from less successful efforts.

**4) Pay more attention to major topics on climate change, social science, integrated modeling and forecasting to support decision-making, adaptive management, and an ecosystem/holistic approach. These important topics need integrated approaches.**

Suggestions:

- a. More closely tie the Delta Science Plan to major efforts to improve Delta science, like the Science Enterprise Workshop, which has been endorsed by the Delta Plan Interagency Committee (DPIIC). Some of those recommendations are part of the Delta Science Plan without citing the Science Enterprise Workshop recommendations or rationale. More attention should focus on clearly identifying science leadership, adopting real adaptive management and increasing the use of integrated modeling and forecasting to support decision-making as building blocks to enhance collaboration and communication.
- b. Climate could be addressed better through more integrated approaches and use of climate change science as an integration framework. Addressing climate change is more than just adding another variable to existing models. At times, climate change seems lost in the discussion of emerging technology. How to incorporate uncertainty and risk assessment into decision making should be included.
- c. Incorporate integrated modeling and forecasting to support decision-making. This recommendation came from the Science Enterprise Workshop and from the Delta ISB's Fish and Flows review, and other efforts. Integrated bio-physical-chemical modeling fosters true collaboration among disciplines and the forecasting part ties the science directly to management and stakeholders, relevancy and social needs. Consider making this a specific action.
- d. Ecosystem science and integration of multiple species and multiple stressors should be included as a framework. A strong specific recommendation on the need for ecosystem science and integrating multiple species and stressors should be included. Such high-level approaches will help improve management and foster cross-disciplinary and cross-agency collaboration.
- e. The Delta Science Plan should discuss more specifically how social scientists might be included in Delta science to improve scientific understanding of the values of the Delta as a place and how these values interrelate with Delta environmental processes, their management and setting priorities. These are difficult questions to address, but are central to a complete science plan.

**5) Include indicators to help measure progress.** The plan's goal is stated as: "Success of the Delta Science Plan and collective progress towards the vision of *One Delta, One Science* will be met through achieving the following six objectives." It is unclear how progress toward each objective can be measured, aside from perhaps using surveys.

Suggestions:

- a. Objectives might be stated to facilitate measurement of progress, so "levels of achievement" can be stated, which will be more useful than highly subjective

success/fail judgments.

**6) The document could be clearer and more concise.** A shorter and more concisely worded plan would be more readable (and effective). Adjust length and structure appendices to not exceed the attention spans of target audiences.

Suggestions:

- a. Shorten the Introduction. Repetition of the 6 objectives is distracting. Perhaps focus the Introduction on the why, what, and how the plan fits in the overall picture. Place the summary of action items and priority items in the Executive Summary. The Introduction should explain the organization of the plan (currently on page 13). Consider adding a Conclusions section.
- b. Twenty-six actions seems like a lot. Consider consolidating or omitting lower priority actions. Perhaps add a wrap-up/synthesis section on specific next steps and key outcomes expected from this plan (perhaps entitled, "What does this Delta Science Plan hope to achieve?"). Little attention is given to objective #4 (Manage scientific conflict), so consider omitting. Consider ordering objectives in rough priority. Consider more integration and aspiration with the multiple specific actions going into appendices.
- c. Include further documentation of how information for the update was invited, vetted and selected for inclusion. Box 1-3 does this concisely, but more information on the process and engagement of groups outside the Delta Science Program help in communicating the shared process.
- d. Include a little more on the intended and actual roles of the Delta Stewardship Council in the Delta Science Plan.
- e. Better format each Problem Statement and its ensuing material to make them easier to identify and follow. Does each Problem need to include "action participants" after assigning "primary responsibility?" The broad listing of "actors" diffuses responsibility. Could "expected outcomes" be replaced with "performance measures?"
- f. Some diagrams and cartoons are presented without explanation. These were often not understandable and without more detail, few will take time to interpret them.
- g. Appendices are an excellent resource and seem complete, but perhaps drop some short ones.
- h. The plan needs heavy editing. The unavailable Preamble will be critical.

In summary, since 2009, there has been a maturation, evolution and strengthening of the scientific foundation, framework and coordination of the science supporting management decisions for the Delta. We probably have reached a point where a more formal merging and tightening of science priorities, science execution and integration across institutions can be usefully achieved. Coordinating state and federal agencies is important, and a full science plan

- 231 for the Delta would be useful for this. This is what was anticipated by long-standing Delta ISB  
232 calls for a Delta science plan. The updated Delta Science Plan should acknowledge its limited  
233 focus and suggest possible steps toward a full Delta Science Plan.

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